

Surveillance for Foodborne and Diarrheal Diseases: Integration of Environmental Inspection and Testing

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A Plethora of Current Surveillance Systems

Foodborne and Diarrheal Diseases National Case Surveillance Systems

- **National Notifiable Diseases Surveillance System (NNDSS)**
 - **Reports via the National Electronic Telecommunications System for Surveillance (NETSS)**
- **Public Health Laboratory Information System (PHLIS)**

Diseases Under Surveillance

National Notifiable Diseases Surveillance System

- Botulism
- Enterohemorrhagic *E. coli* (EHEC) infection
- Hemolytic Uremic Syndrome (HUS)
- Listeriosis
- Salmonellosis
- Shigellosis
- Cholera
- Typhoid fever
- Campylobacteriosis, Yersiniosis

Pathogens Under Surveillance

Public Health Laboratory Information System

- *Campylobacter* spp.
- Shiga toxin-producing *E. coli*
- *Salmonella* Serotypes
- *Shigella* spp.
- *Vibrio* spp.

Public Health Laboratory Information System

- Established to collect pathogen subtype information from public health laboratories
- Started with *Salmonella* serotypes, now collects information on a large number of pathogens

Importance of Subtype Information

Salmonella

- **Common cause of Foodborne disease**
- **Over 2000 serotypes**
- **Serotypes have individual biology and epidemiology**
 - ***S. Typhi* - Typoid fever**
 - ***S. Enteritidis* - Egg associated**
 - ***S. Typhimurium* - Cattle associated**

Additional Disease Surveillance Systems

- **Botulism**
- **Cholera**
- **Typhoid**

FDDB Administered Surveillance

- **Many more variables used for clinical, laboratory and epidemiologic characterization**
- **Confirmation of cases with reporting health departments**
- **Includes variables to assess How? and Why?**

Foodborne Outbreak Surveillance

- Electronic Foodborne Outbreak Reporting System
- *Salmonella* Enteritidis outbreaks
- *E. coli* O157 outbreaks

Foodborne and Diarrheal Diseases Sentinel Surveillance Systems

- **Foodborne Diseases Active Surveillance Network (FoodNet)**
 - 10 states or parts of states
- **National Antimicrobial Resistance Monitoring System- Enteric Bacteria (NARMS)**
 - 50 states



PulseNet

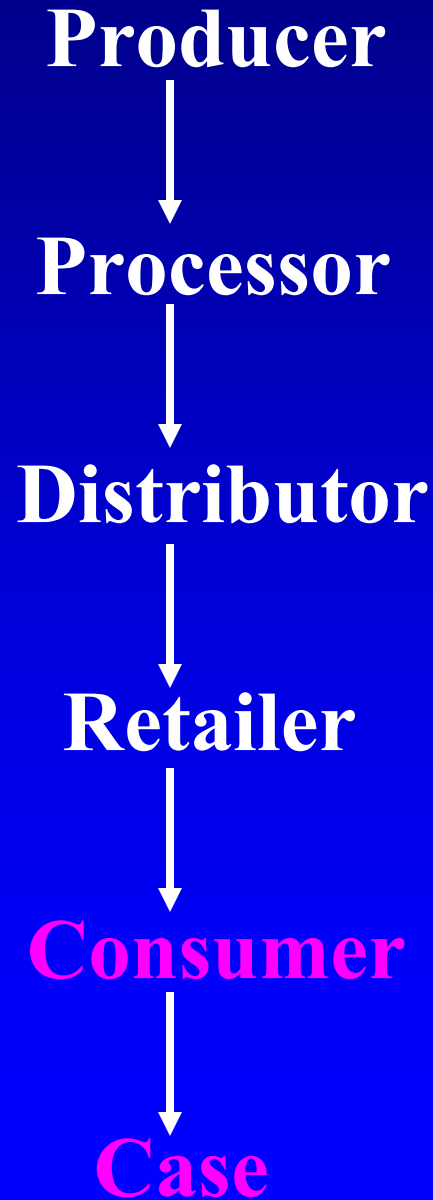
- **Network of foodborne diseases genotyping laboratories**
- **Determine, share and submit genotype patterns for bacterial foodborne pathogens**
- **Serves to identify outbreaks by detecting genotype clusters among isolate**
- **Serves to define outbreaks by inclusion or exclusion of related isolates**

Limitations to Current Surveillance Systems

- **Proliferation of duplicative and incompatible systems**
- **No direct link between laboratory and epidemiologic data for case surveillance**
- **Captures little environmental inspection and testing data**

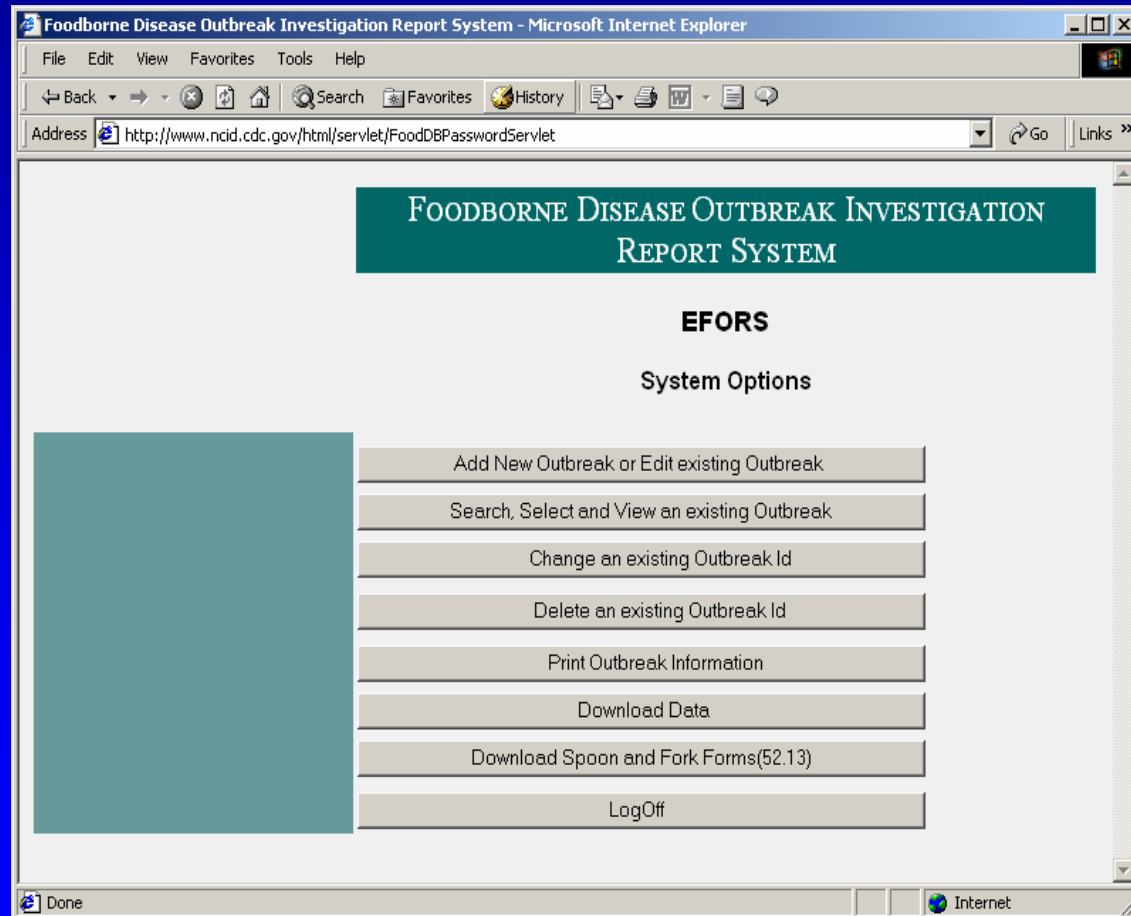
Integrating Environmental Data

The Farm to Doctor Continuum



Electronic Foodborne Outbreak Reporting System (EFORS)

- Active at federal level
- Linelists published on web
- Electronic reporting (EFORS)
- NEDSS compliant



Electronic Foodborne Outbreak Reporting System (EFORS)

- Pathogen lists with serotype, genotype
- Links to ref materials

FOODBORNE DISEASE OUTBREAK INVESTIGATION REPORT FORM - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print Mail News RSS Feeds

Address http://www.ncid.cdc.gov/html/servlet/FoodOptionsServlet Go Links

This form is used to report foodborne disease outbreak investigations to CDC. A foodborne outbreak is defined as the occurrence of two or more cases of a similar illness resulting from the ingestion of a common food in the United States. This form has two parts: Part 1 asks for the minimum data needed and Part 2 asks for additional information. For this investigation to be counted in the CDC annual summary Part 1 must be completed. We encourage you to complete as much of Part 1 and Part 2 as you can.

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Go Back to Options Page Ignore Any Changes Made on This Page

Part 1: Required Information (continued)

CDC USE ONLY 4
STATE USE ONLY TN-01-01

6. Etiology: (Name the bacteria, virus, parasite, or toxin that are not found under "Serotype" in "Other characteristics" section. Enter molecular fingerprinting, antibiogram, metabolic profile, etc.)

Etiology (****Hint: To erase an entry choose the blank line at the top of the picklist****)

Salmonella

☒ Confirmed ☐ Suspected [Confirmation Criteria](#)

☐ Confirmed ☐ Suspected [Confirmation Criteria](#)

☐ Confirmed ☐ Suspected [Confirmation Criteria](#)

Done

Emmerich
Encino
Enschede
Entebbe
Enteritidis
Enugu
Epocrates
Epinay
Eppendorf
Epping
Erlangen
Enteritidis

on organism or toxin that
ulence factors, [Help](#)

Other characteristics

FoodNet (CDC) - Microsoft Internet Explorer

Address http://www.cdc.gov/ncidod/diseases/outbreak/pade_fdr.htm

0. Nontyphoidal Salmonella	6 hrs-10 days; usually 6-48 hrs	Diarrhea, often with fever and abdominal cramps	Isolation of organism of same serotype from clinical specimens from two or more ill persons
			OR
			Isolation of organism from epidemiologically implicated food
9. Salmonella Typhi	3-60 days; usually 7-14 days	Fever, anorexia, malaise, headache, and myalgia; sometimes diarrhea or constipation	Isolation of organism from clinical specimens from two or more ill persons
			OR
			Isolation of organism from epidemiologically implicated food
10. Shigella spp.	12 hrs-6 days; usually 2-4 days	Diarrhea (often bloody), often accompanied by fever and abdominal cramps	Isolation of organism of same serotype from clinical specimens from two or more ill persons
			OR

Electronic Foodborne Outbreak Reporting System (EFORS)

FOODBORNE DISEASE OUTBREAK INVESTIGATION REPORT FORM - Microsoft Internet Explorer

Window for Selecting Food Items - Microsoft Internet Explorer

FOODBORNE DISEASE OUTBREAK INVESTIGATION REPORT FORM

EFORS

ENTER A TEXT TO SEARCH:

OR

Main Food:

Beverages
Dairy
Desserts
Eggs
Specialty/Ethnic dish
Fish
Fruit
Grains
Meats
Miscellaneous

Sub Food1:

Sub Food2:

Sub Food3:

Other

Implicated Food2

☐ Confirmed
☐ Suspected

Main Ingredients Food2

To erase an entry, choose the blank line at the top of picklist

Contaminated Ingredients Food2

To erase an entry, choose the blank

**Food Vehicle
Module**

Electronic Foodborne Outbreak Reporting System (EFORS)

- **Investigation methods**
 - **Epidemiologic investigation**
 - **Food preparation review**
 - **Investigation of production plant or farm**
- **Contributing factors**
 - **Storage in contaminated environment**
 - **Inadequate cleaning of equipment**
 - **Inadequate storage temperature**

Environmental Inspection and Testing

Data Sources

- **Foodservice establishment inspections**
 - **Core function of local public health**
 - **Routine**
 - **Based on FDA standard model food code**
- **Water quality testing**
 - **Contamination**
 - **Disinfection**

Environmental Inspection and Testing

Data Sources

- **FDA and USDA food testing**
 - Retail food sampling and testing
 - Imported food sampling and testing
 - Plant monitoring
- **Industry animal and food testing**
 - Quality control programs (HACAP)
 - Specific pathogen control programs

Salmonella Enteritidis (SE) and Eggs

- **Retail and Distribution**
 - **Refrigeration**
 - **Pooling**
- **Production**
 - **Routine environmental testing for SE**
 - **Egg testing for SE**
 - **Feed testing for SE**
 - **Pest control**
 - **Certified SE-free chicks**
 - **Biosecurity**

Farm to Doctor

Integrated Foodborne Diseases Surveillance

- **Pathogen testing at production, processing, retail and patient level with standard subtype analysis**
 - **Identify sources of pathogens**
 - **Focus control measures**
 - **Monitor effectiveness**

Farm to Doctor

Integrated Foodborne Diseases Surveillance

- **Environmental inspection to identify contributing factors for food contamination**
 - **Temperature abuse**
 - **Cross-contamination**
 - **Environmental contamination**
 - **Human contamination**

Farm to Doctor

Integrated Foodborne Diseases Surveillance

- **Tremendous opportunity but many challenges**
 - **Technical aspects of data integration**
 - **Standardized methods required for comparisons**
 - **Data confidentiality and ownership**
 - **“Self incriminating” for industry**
 - **Over regulation**
 - **Funding**